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Re: Application No. 10/826,093

Inventor and Applicant: James G. Sullivan

Filing Date: April 16, 2004

Group Art Unit: 3673

Examiner: Jon Suk Lee

Title: Pin and Collar Shoring Device

DECLARATION OF JAMES G. SULLIVAN

I, James G. Sullivan, a natural individual residing and doing business at 10013 Norwood, Rosemont, Illinois 60018, U.S.A., am competent to make this declaration. The statements made herein are true and based upon personal knowledge, and the statements made upon information and belief are believed to be true.

1. In 1978 I attended the Fire Science Program at Oakton Community College in Morton Grove, Illinois. There I became certified as a State of Illinois emergency medical technician for ambulances (EMT-A) by the Illinois Department of Public Health.

2. In 1979 I attended the Loyola Medical Center Paramedic Program where I became a certified paramedic by the Illinois Department of Public Health.

3. In 1981 I obtained a position with the Rosemont Department of Public Safety in Rosemont, Illinois, as a public safety officer (i.e., both police officer and firefighter). I also became the training officer for the fire suppression division of the Department of Public Safety in Rosemont.

4. In 1982 I attended the Arlington Heights Fire Academy in Arlington Heights, Illinois where I was certified by the Illinois Office of the State Fire Marshall as a Firefighter-II.

5. In 1986 I became an instructor in the Technical Rescue Program of the Arlington Heights Fire Academy. I soon taught a class which specialized in OSHA regulation for trench rescue work, and which I have continued for the past fourteen years.

6. In 1991 I formed an Illinois distributorship for manufacturers of trench shoring products, and I operated this distributorship for fourteen years. I subsequently dissolved this distributorship and incorporated Prospan Manufacturing, Inc. for sale of my own equipment.

7. In addition to my position as a lieutenant for the Rosemont Department of Public Safety and an instructor with the Arlington Heights Fire Academy, in 2002 I became an instructor of OSHA Excavation Standard 29 CFR 1926.650 through Start Group. Start Group is a company retained by municipal and private sector entities such as insurance

companies for instruction of excavation procedures. Through Start Group I have instructed over one hundred municipalities on the OSHA Excavation standard throughout the United States.

8. I have presented the following lectures and demonstrations:

a. Wisconsin Underground Contractors Association, Milwaukee, Wisconsin

b. Chicago Damage Prevention Council, University of Chicago, Chicago, Illinois

c. Illinois Commerce Commission, Peoria, Illinois

d. Underground Focus Magazine, Manteno, Illinois (shoring and rescue demonstrations)

9. I have personally participated in three trench cave-ins, of which two were rescues and one was a body recovery. I directed the trench operations for two of these incidents.

10. I originally presented a structural design for a new pneumatic trenching device to a prototype designer, who then created a computer model based upon my design.

11. A second company created aluminum castings for the computer generated model while a third company produced the remaining aluminum components. Both companies produced the molds for these components.

12. I acquired remaining components, such as screws, lanyards and rubber piston cups, from other manufacturers.

13. Aluminum is the standard material for pneumatic shoring, hydraulic shoring, and lightweight trench shields because it is very strong yet lightweight. Aluminum components are easily modified by machining, such as by drilling apertures.

14. My new trench shoring device required either (1) a particular strength and grade of aluminum alloy; or (2) a new material.

15. I visited Michigan State Advanced Materials Engineering Services at Michigan State University to determine if there were superior alternative materials to aluminum for my device. At this time I knew the compression strength of a popular marketed trenching device, and one goal was to supersede this strength.

16. According to the Michigan State staff person, one alternative to aluminum is a fiber reinforced composite plastic. This plastic exhibits a very high crush-strength, but it would not withstand internal pressures after compressed air enters the cylinder during installation and removal. This pressure usually ranges between 150 and 300 pounds per square inch (psi). He also stated that this internal pressure problem would be very expensive to overcome through materials research and development.

17. I declined to develop a fiber reinforced plastic, although I was aware that this material is used in airplane designs. However, I still required the exact grades of aluminum for my device.

18. The company personnel who produced a portion of my aluminum components explained the strength differences between the available aluminum grades. The staff recommended 6061–T6 aluminum alloy, because it met my strength requirements.

19. Aluminum alloy 6061 exhibits a greater compression strength than aluminum alloy 6063, although 6063 has a more pleasing appearance when anodized (i.e., the aluminum is submerged in a chemical bath containing colored dye). Because aluminum alloy 6063 fails by buckling or distortion, I selected 6061 based upon its greater compression strength.

20. I also applied a process, known as T6, to aluminum alloy 6061 to further increase the crush strength. This process involves placing the heated aluminum in water after it is extruded or cast. Aluminum 356-T6 is better suited for sand casting, which is why I selected it instead of 6061-T6 for sand casting components.

21. The completed model of my completed device exceeded the 45,000 pound maximum load for crush strength at the Illinois Institute of Technology engineering test laboratory. I tested larger models of my trench shoring device at the University of Illinois engineering laboratory.

22. My trenching device with ratcheting collar, described in U.S. Pat. No. US 6,746,183 B1, incorporates the above features and the above described testing was performed upon this patented model. However, my patented ratcheting device requires more air pressure to release the collar after operation than during installation. For an operator to install the patented device in a trench generally requires 150 pounds per square inch (psi).

23. To remove the device by manually loosening the collar in the reverse direction, and depressing the spring biased locking member, requires at least 200 psi. This additional pressure is necessary because the operator provides an extra manual twist for a tight lock during installation.

24. Firefighters generally have air cylinders available for generating 200 psi. However, public works operators are routinely provided with air cylinders which are set at one pressure which is typically 150 psi. This value is the only air pressure available to the operators with current infrastructure.

25. As a result, public works operators require an outer collar which prevents the piston from becoming a projectile, but which does not require the higher pressure for release of the interlocking serrations of my previous patented model. However, I soon realized that with a different collar and inner ring structural design, I could provide both firefighters and public works operators with:

(1) a cooperating inner ring and outer collar which avoid time-consuming manual effort to release; (2) for which only one (lower) air pressure is necessary; (3) yet maintain the anti-projectile feature.

26. To redesign the collar and inner ring, I directed the staff of one company responsible for producing my components to eliminate (1) the spring loaded lock member of the outer collar and (2) interlocking serrations of the inner ring.

27. Along the same inner ring circumference on which the serrations were originally located, I designed a continuous circular indentation.

28. I next selected a stainless steel flat bolt, with an approximate 7/16 inch diameter and approximately 18 threads per inch, for the rotating pin of my new outer collar. It is also the same size bolt as those used in my swivel end attachments, thus keeping costs lower. I selected the stainless steel material because it does not easily rust in adverse weather conditions.

29. I determined that the best pin length was approximately one and one-eighth inches. At that length the threaded pin protrudes approximately one-quarter of an inch from the outer collar exterior surface, while contacting the inner ring indentation floor. If the pin's abutting furthermost stem point or the indentation floor subsequently abrades, the previously protruding pin compensates for its own reduced pin length, increased distance from the exterior surface to the indentation floor, and reduced thickness of the indentation floor.

30. This larger diameter bolt has a flat base which contacts the indentation floor. I included this feature because if more base surface contacts the indentation floor, then there is additional friction to prevent loosening of the outer collar.

31. I determined that the continuous circular indentation's width should be only slightly greater than the pre-selected threaded pin diameter. This width is best because (1) the indentation need only be sufficiently wide to allow the outermost pin flat end to strike without physical interference by the indentation walls, and (2) less machining of each inner ring is required, thereby lowering production cost.

32. I determined by trial and error that the indentation depth must be sufficiently shallow to maintain the strength of the inner ring wall. Simultaneously this depth must create two

indentation walls which prevent the threaded pin from slipping from the indentation floor during transport of the device. The final depth to the indentation floor became the original maximum depth of the serrations of my patented device.

33. The spring loaded lock member was removed from the original mold and replaced with the raised round 'boss.' The threaded opening through the outer collar was then created by machining.

34. During tightening of the outer collar, the threaded pin penetrates the outer collar and strikes the circular indentation instead of the cylinder. As a result, the inner ring circular continuous indentation prolongs a cylinder's useful life, because the cylinder wall does not weaken from the pin's concentrated force over a very small curved area. Although the inner collar also eventually weakens from the pin's force, the inner collar is much less expensive to replace.

35. To attach a handle to the threaded pin stem, I designed a mold of the appropriate size and shape. The handle requires a size and shape which is easily rotated by a hand within a thick glove, and which I designed based upon my professional experience "in the field." Although I originally considered plastic for the handle, I selected aluminum because this metal matches the outer collar.

36. To maintain low production and retail prices, the foundry staff machines the circular indentation into each inner ring, instead of producing a separate mold which incorporates the continuous circular indentation.

Further Declarant sayeth not.

J. Sullivan

James G. Sullivan,

Inventor and Applicant

DECLARATION

The undersigned, being hereby warned that willful false statement and the like are punishable by fine or imprisonment, or both, under 18 U.S.C. 1001, and that such willful false statements and the like may jeopardize the validity of this application or document or any registration resulting therefrom, declares that he is properly authorized to execute this document, and declares that all statements made on his own knowledge are true, and all statements made on information and belief are believed to be true.

James G. Sullivan

Date: 6-13-05